General

Guideline Title

Attention-deficit hyperactivity disorder.

Bibliographic Source(s)

University of Michigan Health System. Attention-deficit hyperactivity disorder. Ann Arbor (MI): University of Michigan Health System; 2013 Apr. 41 p. [14 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: University of Michigan Health System. Attention-deficit hyperactivity disorder. Ann Arbor (MI): University of Michigan Health System; 2005 Oct. 35 p. [8 references]

Recommendations

Major Recommendations

Note from the University of Michigan Health System (UMHS) and the National Guideline Clearinghouse (NGC): The following guidance was current as of April 2013. Because UMHS occasionally releases minor revisions to its guidance based on new information, users may wish to consult the original guideline document or the most current version.

The strength of recommendation (I-III) and levels of evidence (A-D) are defined at the end of the "Major Recommendations" field.

Key Points

Epidemiology

Common

Attention-deficit hyperactivity disorder (ADHD) is the most common behavioral disorder in school-age children – a U.S. community prevalence of 6-8% that is more common in boys [*C*]. In at least 30% of diagnosed children ADHD continues into adulthood, with 3-4% of adults meeting criteria for ADHD [*C*].

Primary Care Provider

Most children with ADHD receive care through primary care physicians.

Diagnosis

Types

Diagnosis is based on the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV-TR) criteria (see Table 1 in the original guideline document) [*D*]. The three main types are primary hyperactive, primary inattentive, and combined.

Multiple Sources

No specific test can make the diagnosis. Input from both parents and teachers or other source is required. Some psychological rating tools are useful but are not diagnostic (e.g., Vanderbilt, Conners; see Figure 1, Tables 1 & 2, and Appendix A1 in the original guideline document). If a learning problem is suspected, consider neuropsychiatric testing for intelligence testing (IQ) and learning disorders.

Confused and Associated Conditions

Diagnosis is complicated by overlapping symptoms or co-occurrence of other disorders (e.g., anxiety disorders, bipolar disorder, obstructive sleep apnea, fetal alcohol syndrome, major depressive disorders, learning disorders, oppositional defiant disorder, post traumatic stress disorder, reactive attachment disorder; see Appendices B1 & B2 in the original guideline document).

Treatment (See Table 4 in the original guideline document)

Drug Treatment

- Stimulants are the first line treatment and have proven benefit to most people. If one class of stimulant fails or has unacceptable side effects then another should be tried (Tables 5-7 in the original guideline document) [*IA*].
- Atomoxetine is a secondary choice [*IA*]. (One reported side effect is suicidal thinking.)
- Other medications may be used alone or in combination depending upon the ADHD type, response to therapy or comorbidity profile: e.g., Alpha-II agonists (clonidine, guanfacine) with hyperactivity or impulsivity; bupropion (over age 8) with co-morbid depression; risperidone (atypical antipsychotic) for aggression (see Table 7 in the original guideline document) [*IIA*].
- Comorbid conditions may require additional treatment (e.g., for depression) and consideration of referral to a mental health specialist.

Non-Pharmacologic Interventions

- Age-appropriate behavioral interventions at home: education and support [*IB*]; parent interventions including routines, clear limits and positive reinforcement for target behaviors (for children); consider family therapy; cognitive behavioral techniques for adults [*IIB*] (see Table 8 and Appendix A2 in the original guideline document).
- School interventions: children with ADHD may qualify for a 504 education plan or special education services with individualized education plan (IEP) [*ID*] (see Appendices A3 & A4 in the original guideline document).

Special Populations or Circumstances

Special considerations apply to: 3-5 year olds, adolescents and adults, head-injured, intellectually disabled/autistic, fetal alcohol syndrome, and substance-abusing patients (see Appendix B3 in the original guideline document).

Controversial Areas

Common Myths

Several common beliefs related to ADHD are untrue, e.g., that it is not a real disorder, it is an over-diagnosed disorder, children with ADHD are over-medicated.

Diets

Although a few studies suggest dietary modification may have promise, there is no proof of efficacy (e.g., individually tailored hypoallergenic diets, essential fatty acids, flax seed) [*IIB*], studies have shown the Feingold diet and modifying sugar consumption have no effect [*IIIB*].

Complementary Alternative Medicine

Use is controversial, but common (see Appendix B4 in the original guideline document).

Definitions:

Levels of Evidence Supporting a Diagnostic Method or an Intervention

A. Randomized controlled trials
B. Controlled trials, no randomization
C. Observational trials
D. Opinion of expert panel

Strength of Recommendation

I. Generally should be performed
II. May be reasonable to perform
III. Generally should not be performed

Clinical Algorithm(s)

An algorithm is provided in the original guideline document for the diagnosis and treatment of the child age 4-18 years with attention-deficit hyperactivity disorder (ADHD).

Scope

Disease/Condition(s)

Attention-deficit hyperactivity disorder (ADHD)

Guideline Category

Diagnosis

Evaluation

Management

Treatment

Clinical Specialty

Family Practice

Internal Medicine

Pediatrics

Psychology

Intended Users

Advanced Practice Nurses

Nurses

Physician Assistants

Physicians

Psychologists/Non-physician Behavioral Health Clinicians

Guideline Objective(s)

- To recognize and treat attention-deficit hyperactivity disorder (ADHD) early in the primary care setting
- To identify appropriate treatment options and drug side effects
- To identify common co-morbidities and indications for referral
- To identify appropriate support resources for patients and their families

Target Population

Children and young adults age 3 to 30 years

Note: Considerations for preschool children (3-5) and adults (18-30) are discussed as "Special Populations."

Interventions and Practices Considered

Assessment/Diagnosis

1. Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV-TR) criteria to establish diagnosis
2. Input from multiple sources (parents, teachers, others)
3. Assessment for coexisting conditions

Management/Treatment

1. Pharmacologic therapy
    - Stimulants (methylphenidate, dexmethylphenidate, mixed amphetamine salts, dextroamphetamine, lisdexamfetamine)
    - Non-stimulants (atomoxetine)
    - Alpha-II agonists (clonidine, guanfacine)
    - Bupropion
    - Risperidone
2. Referral to mental health professional
3. Non-pharmacologic therapy
    - Age-appropriate behavioral interventions at home (education and support, parent interventions including routines, clear limits and positive reinforcement for target behaviors for children, family therapy, cognitive behavioral techniques for adults)
    - School interventions (504 education plan or special education services with individualized education plan)
4. Special considerations for specific populations (3-5 year olds, adolescents and adults, head-injured, intellectually disabled/autistic, fetal alcohol syndrome, and substance-abusing patients)

Major Outcomes Considered

- Incidence of comorbid disorders
- Adverse effects of drug therapy
- Response to therapy
- Academic performance
- Symptom control
- Incidence of substance abuse disorders

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Searches of Unpublished Data

Description of Methods Used to Collect/Select the Evidence

The literature search for this update began with results of the literature search performed in 2002 to develop the initial guideline released in 2005. The literature search for this update used keywords that were very similar to those used in the previous search. However, instead of beginning the search with literature in 2002, the guideline team accepted the search strategy and results for the search performed through April 2006 for the American Academy of Child & Adolescent Psychiatry (AACAP) Practice Parameter for the Assessment and Treatment of Children and Adolescents with Attention-Deficit/Hyperactivity Disorder (ADHD).

The search for this update was conducted prospectively using the major keywords of: attention deficit disorder with hyperactivity, humans age 3-30, clinical guidelines, controlled clinical trials, cohort studies, English language, and published 1/1/07-1/1/10 on Medline. Additional key words for specific searches included: symptoms (academic underachievement, behavior problems, classroom behavior, classroom interventions, degree of functional impairment, evidence of school work, frequent disciplinary events, hyperactivity, impulsivity, inattention, learning patterns, poor concentration, poor task completion, social adjustment), commonly associated/coexisting conditions (learning/language disorder, child abuse, medication side effects, oppositional defiant disorder, conduct disorder, anxiety, depression), commonly confused conditions/differential diagnosis (learning disorder, intellectual disability, mood/anxiety disorder, abuse, developmental delay, static encephalopathy, pervasive development disorder, autism spectrum, absence seizures, sleep disorder, substance abuse) evaluation and testing (vision exam, hearing exam, growth chart, developmental review, neurological exam, chronic physical or mental disorders), rating scales for ADHD, qualitative electroencephalogram (EEG) and functional magnetic resonance imaging (MRI), other EEG, cognitive behavioral therapy, behavioral interventions (set limits, establish routines, provide positive reinforcement), parental intervention (parenting class, family therapy), alpha-II agonists (clonidine, tenex), antidepressants – wellbutrin, effexor, tricyclics (imipramine, nortriptyline, desipramine), stimulants (adderall, concerta, daytrana, dexedrine, dextroamphetamine, focalin, metadate, methylphenidate, ritalin, vyvanse), modafanil, strattera, transitional and longitudinal care for adults (since 10/1/02), and nutritional supplements and diet (since 10/1/02).

The search was conducted in components each keyed to a specific causal link in a formal problem structure (available upon request). The search was supplemented with very recent clinical trials known to expert members of the panel. Negative trials were specifically sought. The search was a single cycle.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Levels of Evidence Supporting a Diagnostic Method or an Intervention

A. Randomized controlled trials
B. Controlled trials, no randomization
C. Observational trials
D. Opinion of expert panel

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Conclusions were based on prospective randomized controlled trials if available, to the exclusion of other data; if randomized controlled trials were not available, observational studies were admitted to consideration. If no such data were available for a given link in the problem formulation, expert opinion was used to estimate effect size.

Rating Scheme for the Strength of the Recommendations

Strength of Recommendation

I. Generally should be performed
II. May be reasonable to perform
III. Generally should not be performed

Cost Analysis

Tables 5 – 8 in the original guideline document provides an overview of dosing, cost, side effects and other information for first line and second line agents for treatment of attention-deficit hyperactivity disorder (ADHD), respectively.

Method of Guideline Validation

Comparison with Guidelines from Other Groups

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

- Drafts of this guideline were reviewed in clinical conferences and by distribution for comment within departments and divisions of the University of Michigan Medical School to which the content is most relevant: Child and Behavioral Health, Family Medicine, General Pediatrics, and Child and Adolescent Psychiatry. The Executive Committee for Clinical Affairs of the University of Michigan Hospitals and Health Centers endorsed the final version.
- The University of Michigan Health System (UMHS) Clinical Guideline on attention deficit hyperactivity disorder (ADHD) is consistent with:
  - American Academy of Child and Adolescent Psychiatry – Practice parameter for the assessment and treatment of children and adolescents with attention-deficit/hyperactivity disorder, 2007
  - American Academy of Pediatrics – ADHD: Clinical practice guideline for the diagnosis, evaluation, and treatment of Attention-Deficit/Hyperactivity Disorder in children and adolescents, 2011

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Conclusions were based on prospective randomized controlled trials if available, to the exclusion of other data; if randomized controlled trials were not available, observational studies were admitted to consideration. If no such data were available for a given link in the problem formulation, expert opinion was used to estimate effect size.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate diagnosis and management of patients with attention-deficit hyperactivity disorder (ADHD)

Potential Harms

Adverse effects of stimulants and non-stimulants used in treatment of attention-deficit hyperactivity disorder (ADHD) are listed in Table 6 in the original guideline document. Drug class side effects for second-line drugs are listed in Table 7 in the original guideline document.

Contraindications

Contraindications

Bupropion is contraindicated in patients who have bulimia or anorexia nervosa.

Qualifying Statements

Qualifying Statements

These guidelines should not be construed as including all proper methods of care or excluding other acceptable methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding any specific clinical procedure or treatment must be made by the physician in light of the circumstances presented by the patient.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Clinical Algorithm

Patient Resources

Resources

Staff Training/Competency Material

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

University of Michigan Health System. Attention-deficit hyperactivity disorder. Ann Arbor (MI): University of Michigan Health System; 2013 Apr. 41 p. [14 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2005 Oct (revised 2013 Apr)

Guideline Developer(s)

University of Michigan Health System - Academic Institution

Source(s) of Funding

University of Michigan Health System (UMHS)

Guideline Committee

Attention-Deficit Hyperactivity Disorder (ADHD) Guideline Team

Composition of Group That Authored the Guideline

Team Leaders: John M O'Brien, MD, Family Medicine; Jennifer G Christner, MD, Child Behavioral Health

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Financial Disclosures/Conflicts of Interest

The University of Michigan Health System endorses the Guidelines of the Association of American Medical Colleges and the Standards of the Accreditation Council for Continuing Medical Education that the individuals who present educational activities disclose significant relationships with commercial companies whose products or services are discussed. Disclosure of a relationship is not intended to suggest bias in the information presented, but is made to provide readers with information that might be of potential importance to their evaluation of the information. No member of the guideline team (Drs. O'Brien, Christner, Biermann, Felt, Harrison, and Kochhar) nor the consultant (Dr. Streetman) has such a relationship.

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: University of Michigan Health System. Attention-deficit hyperactivity disorder. Ann Arbor (MI): University of Michigan Health System; 2005 Oct. 35 p. [8 references]

Guideline Availability

Electronic copies: Available from the University of Michigan Health System (UMHS) Web site .

Availability of Companion Documents

The following are available:

- Attention-Deficit Hyperactivity Disorder (ADHD). What's new - cover memo. Ann Arbor (MI): University of Michigan Health System; 2013 Apr. 2 p. Electronic copies: Available in Portable Document Format (PDF) from the University of Michigan Health System (UMHS) Web site .
- Continuing Medical Education (CME) information is available from the UMHS Web site .

In addition, the following tools for clinicians can be found in the original guideline document :

- Appendix A1. Behavioral Rating Scales
- Appendix A2. Tips for Parents
- Appendix A3. ADHD and Educational Rights
- Appendix A4. Special Education and Evaluation Terms
- Appendix B1. Definitions of Selected Psychiatric Disorders
- Appendix B2. Conditions That May Be Confused with ADHD
- Appendix B3. Special Patient Populations
- Appendix B4. Overview of complimentary/alternative medicine (CAM)

Patient Resources

The following is available:

- ADHD: what parents need to know. University of Michigan Health System; 2009 Jul. Various p. Electronic copies: Available from the University of Michigan Health System (UMHS) Web site .

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and

answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

This summary was completed by ECRI on December 8, 2005. The information was verified by the guideline developer on January 24, 2006. This summary was updated by ECRI on August 28, 2006 following the updated U.S. Food and Drug Administration advisory on Adderall. This summary was updated by ECRI on September 7, 2006 following the updated U.S. Food and Drug Administration advisory on Dexedrine. This summary was updated by ECRI Institute on November 9, 2007, following the U.S. Food and Drug Administration advisory on Antidepressant drugs. This summary was updated by ECRI Institute on July 20, 2009 following the U.S. Food and Drug Administration advisory on Varenicline and Bupropion. This summary was updated by ECRI Institute on January 8, 2010 following the U.S. Food and Drug Administration advisory on Norpramin. This NGC summary was updated by ECRI Institute on July 31, 2013. This summary was updated by ECRI Institute on April 7, 2014 following the U.S. Food and Drug Administration advisory on Methylphenidate ADHD Medications. This summary was updated by ECRI Institute on July 23, 2015 following the U.S. Food and Drug Administration advisory on the Daytrana Patch (methylphenidate transdermal system).

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